Table 1
Different mediators produced by healthy and OA osteoblasts measured by LUMINEX

Osteoblasts	TSLP pg/ml	PAI-1 ng/ml	MCP-1 ng/ml	Leptin pg/ml	Resitin ng/ml	IL-6 ng/ml	IL-8 ng/ml	IL-21 ng/ml	Il-1a pg/ml	GM-CSF pg/ml	Cathepsin S pg/ml
Healthy	13±9	184±130	7±9	366±151	20±32	6±6	6±5	21±2	24±5	19±14	447±235
OA	19±13	91±32	20±12	452±145	5±3	3±3	18±9	23±1	29±6	43±26	1114±630
p	0.088	0.016	0.003	0.029	0.084	0.055	<0.001	0.034	0.028	<0.001	0.002

processes in OA. Importantly, these data are supportive to target osteoarthritic bone in OA to modulate cartilage repair.

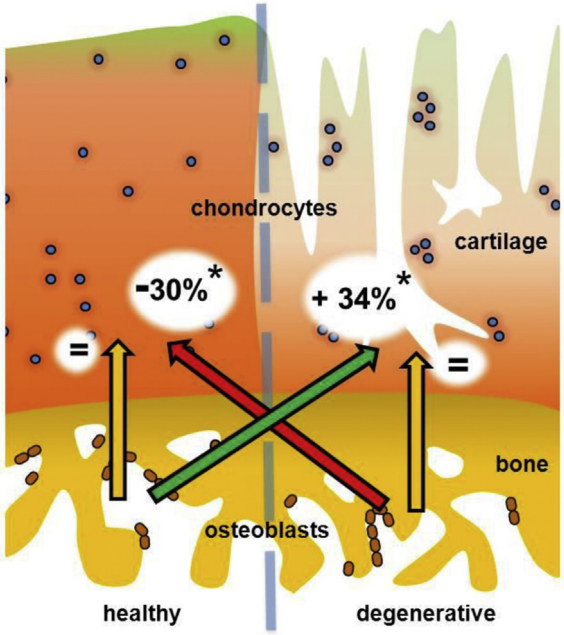

Figure 1. Biochemical effects of bone on cartilage. Human knee subchondral osteoblasts were isolated form healthy donors (n=14) and OA patients (n=16). Osteoblast culture supernatants were subsequently tested on both healthy and osteoarthritic cartilage and changes in proteoglycan (PG) synthesis were studied (mean % change are given).

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MICROSTRUCTURAL OBSERVATION OF COLLAGEN FIBRILS IN THE ARTICULAR CARTILAGE REVEALS A STRUCTURAL DIVERGENCE DEPENDING ON ITS LOCAL MECHANICAL ENVIRONMENT IN HUMAN FEMORAL HEAD

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Purpose: This study analyzed the pattern of collagen deposition in normal and degenerative human articular cartilage of the femoral head by a scanning electron microscope (SEM).
Methods: The femoral heads were obtained from the patients who received the operation of the total hip arthroplasty or the hemiarthroplasty due to osteoarthritis ($n = 7$), avascular osteonecrosis ($n = 5$), femoral neck fracture, and bone tumor ($n = 1$) with informed consent. Small pieces of the articular cartilage were dissected from the femoral head and were stored in Ringer's lactate. The cartilage was kept in the beaker with Ringer's lactate and was replaced in the ultrasonic bath (42,000 Hz) for 15 min to remove proteoglycans from the articular surface. The cartilage was fixed with 2% glutaraldehyde and 2% paraformaldehyde, and then with 1% OsO4. The tissue was dehydrated and was sputter-coated with Au/Pd. The articular cartilage was examined under a SEM. A split-line technique was used, in which a dissecting needle dipped in India ink was inserted in to the cartilage to identify the surface collagen orientations of the femoral head.
Results: Ultrasonic removed amorphous mucinous deposition on the articular surface effectively and enabled the observation for fine architecture of the cartilage. SEM study under low magnification revealed that the orientation of collagen fibrils in the superficial layer was radial from the fovea of the femoral head to the head-neck junction. This orientation of collagen fibrils corresponded with the split-line on the femoral head. Hip joint is a ball and socket joint and the direction of collagen fibrils correlated strongly with preferred alignment of fibrils suitable for joint motion. Under higher magnification, collagen fibrils in the superficial layer ran parallel to the articular surface, oriented randomly from layer to layer, and formed a compact network in the normal cartilage, The density of collagen fibrils was higher in the superior aspect of the femoral head (weight bearing surface) and lower in the inferior aspect (non-weight bearing surface). Chondrocytes, which were buried in collagen fibrils, could be observed only after shaving the articular surface. Fractured surface perpendicular to the articular surface showed that collagen fibrils arose in the subchondral bone then passed towards the surface and arched over to run tangential to the surface like Benninghoff's arcade model. In the degenerative cartilage, derangement and rupture of the collagen network were observed and those changes developed progressively in accordance with the macroscopic severity of osteoarthritis. Chondrocytes in the superficial layer emerged between the disrupted collagen fibrils. Collagen fibrils in the superficial layer were swollen and their diameter was thicker than that of normal cartilage. Vertically oriented collagen fibrils with large diameter were exposed in the area with macroscopic fibrillation. In the specimen from the patients with avascular osteonecrosis, collagen fibrils were almost normal in the early stage of the disease. Breakage of collagen network was seen in the femoral head with collapse.
Conclusions: Collagen fibrils were deposited parallel to the articular surface in the superficial zone, and were aligned radially from the fovea to the margin of the articular cartilage in accordance with the distribution of the split-line. Collagen meshwork was well preserved in normal cartilage and was more meticulous in the weight bearing area, but it was disappeared in the degenerative cartilage. Vertically oriented collagen fibrils with large diameter and exposed chondrocytes were the characteristics in degenerative articular cartilage.

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THREE DIMENSIONAL DISTRIBUTION OF HIP CARTILAGE T2 MAPPING ASSESSED BY RADIAL MR IMAGING: COMPARISON BETWEEN HEALTHY VOLUNTEERS AND PATIENTS WITH HIP DYSPLASIA

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Purpose: Hip dysplasia is one of the main causes for developing hip osteoarthritis, and sensitive and accurate detection of early cartilage lesions is important to estimate disease prognosis and plan conservative or surgical treatments. Several quantitative magnetic resonance (MR) imaging techniques have been developed for assessment of early cartilage degeneration. Though previous hip arthroscopic studies showed frequent involvement of acetabular cartilage degeneration predominantly at anterosuperior limited regions before appearance of radiographic osteoarthritic changes in patients with hip dysplasia, few studies have reported on three-dimensional evaluation with quantitative cartilage MR imaging in the hip joint. The purpose of this study was to investigate 3D distribution of cartilage T2 mapping over the whole acetabular cartilage using radial MRI techniques, and to examine association between cartilage T2 and adjacent labral lesions in healthy volunteers and patients with hip dysplasia.
Methods: Nine symptomatic patients with hip dysplasia (dysplasia group; all female, mean age; 33 ±10 years) and eight asymptomatic healthy volunteers (control group; all female, mean age; 28±2 years) were evaluated with 3.0-T MR imaging system. Patients in the dysplasia group had mean lateral center edge angle of 5.3° (range; -18° to 17°) with no osteoarthritic changes on plain radiographs. Radial T2 map images of the unilateral hip were obtained at 30° intervals passing through the center of